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setting an exposure amount control target value in accordance with a transmittance of said optical system; and transferring said pattern onto said substrate through said optical system while an exposure amount is controlled based on said set exposure amount control target value.

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~~said measurement interval is set in accordance with an exposure condition.~~

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5. An exposure method according to Claim 3, wherein ~~said exposure condition includes one of a minimum line width~~

6. An exposure method according to Claim 2, wherein said measurement interval is changed in accordance with a variation amount between a transmittance obtained by a most recent transmittance measurement and a transmittance obtained by a measurement performed before said most recent measurement.

10 7. An exposure method according to Claim 1, wherein
said setting said exposure amount control target value
includes
a prediction function determining to determine a
transmittance time-varying prediction function for said
15 optical system in accordance with an irradiation history of
exposure light on said optical system, and
setting said exposure amount control target value based
on said determined transmittance time-varying prediction
function.

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8. An exposure method according to Claim 7, wherein said time-varying function is a function expressed by

$$T = a \cdot \exp \left(\sum_{i=1}^k b_i t_i \right)$$

in which T is said transmittance of said optical system, a is a parameter representing a rate of change in said transmittance, and b_i is a parameter dependent on each exposure condition including an illumination condition.

measuring a period of time in which said exposure

measuring an irradiation time of exposure light on said

measuring an exposure light intensity; and

10. An exposure method according to Claim 7, wherein environmental conditions for said optical system is measured at a predetermined time interval, and said environmental conditions are considered when transmittance time-varying prediction function is determined.

measuring a transmittance of said optical system at a
 terminated interval, and

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12. An exposure method according to Claim 11, wherein said predetermined interval of said measuring said transmittance is determined in respect to a relationship with

~~a required exposure precision.~~

13. An exposure method according to Claim 11, wherein
 said interval of said measuring said transmittance is
 5 short when a rate of change in said transmittance of
 said optical system is large, and
 long when said rate of change in said transmittance of
 said optical system is small.

10 *Sub A3* 14. An exposure method to transfer a pattern
 illuminated with exposure light from a light source onto a
 substrate through an optical system, said method comprising:
 setting measurement intervals in accordance with an
 exposure condition; and
 15 measuring a variation in the amount of said exposure
 light passing through said optical system in said set
 measurement intervals.

20 *Sub B4* 15. An exposure method according to Claim 14, wherein
 said exposure condition includes at least one of an
 illumination condition to illuminate a mask, a transmittance
 of said mask, a minimum line width, and a permissible exposure
 amount error.

25 16. An exposure method to transfer a pattern
 illuminated with exposure light from a light source onto a
 substrate through an optical system, said method comprising:
 measuring a variation in the amount of said exposure

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changing said predetermined measurement intervals upon said measuring, in accordance with a comparison result of a variation of a first measurement of said light amount and a variation of a second measurement of said light amount.

18. An exposure method according to Claim 16, wherein said first and second measurements are performed after starting of exposure.

20 a self-cleaning to clean said optical system by
irradiating said optical system with said exposure light on
a predetermined condition prior to exposure;

setting said exposure amount control target value based
on said determined transmittance time-varying prediction

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setting a measurement interval in accordance with an exposure condition; and

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obtaining a transmittance of said optical system in accordance with an amount of said exposure light which is measured before passing through said optical system, and said measurement result of said exposure light passing through said optical system.

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5 an exposure amount setting unit to set an exposure amount
control target value in accordance with a transmittance of
said optical system; and

25. An exposure apparatus according to Claim 24,
further comprising:

said exposure amount setting unit sets said exposure
 amount control target value in accordance with said
 transmittance measured by said transmittance measurement
 unit.

27. An exposure apparatus according to Claim 26,
further comprising:

~~a control unit to set said measurement interval of said~~

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an information reading unit to read information of a mask on which the pattern is formed, and

29. An exposure apparatus according to Claim 26,
further comprising:

15 a control unit connected with said transmittance
measurement unit to set said transmittance measurement
interval of said transmittance measurement unit in accordance
with a variation amount between a transmittance obtained by
a most recent transmittance measurement and a transmittance
20 obtained by a measurement performed before said most recent
measurement, ~~said respective measurement performed by said~~
~~transmittance measurement unit.~~

30. An exposure apparatus according to Claim 29,
25 wherein two sequential measurements of transmittance by said
transmittance measurement unit are performed prior to
starting of exposure.

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~~Sub 48 34. An exposure apparatus according to Claim 32,
wherein said control unit detects said amount of exposure light~~

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having passed through said optical system at a timing which corresponds to a transmittance of said mask on which said pattern is formed.

5 35. An exposure apparatus according to Claim 32, wherein said control unit detects said amount of exposure light having passed through said optical system at a timing set in consideration of one of a minimum line width and a permissible exposure amount error.

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36. An exposure apparatus according to Claim 24, further comprising:

15 a first optical sensor disposed in said light path of said exposure light to detect said amount of exposure light illuminated on said pattern, and

 said exposure amount control system controls said exposure amount based on said exposure amount control target value and an output from said first optical sensor when transferring said pattern onto said substrate.

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37. An exposure apparatus according to Claim 24, further comprising:

25 a calculation unit to determine a transmittance time-varying prediction function of said optical system in accordance with an irradiation history of exposure light on said optical system, and

 said exposure amount setting unit sets said exposure amount control target value based on said transmittance

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on which said pattern is formed; and

a substrate stage disposed in an image plane side of
said projection optical system to hold said substrate, wherein
said optical system includes

5 an illumination optical system disposed in an
optical path of said exposure light to illuminate said
mask on which said pattern is formed with said exposure
light, and

41. An exposure apparatus according to Claim 40,
further comprising:

a driving unit connected with said mask stage and said substrate to synchronously move said mask stage and said substrate stage in a linear direction perpendicular to an optical axis of said projection optical system.

42. An exposure apparatus to transfer a pattern illuminated with exposure light from a light source onto a substrate through an optical system, said exposure apparatus comprising:

a measurement unit to measure a variation in an amount of exposure light passing through said optical system; and
a control unit connected with said measurement unit to change intervals of said measurement performed by said

~~43. An exposure apparatus according to Claim 42,
wherein said measurement unit includes~~

~~a second optical sensor arranged to be substantially flush with said substrate.~~

44. An exposure apparatus to transfer a pattern illuminated with exposure light from a light source onto a substrate through an optical system, said exposure apparatus comprising:

a measurement unit to measure a variation in an amount of exposure light passing through said optical system; and

a control unit connected with said measurement unit to change an interval of a measurement performed by said measurement unit, in accordance with a comparison result of a variation of a first measurement of said light amount and a variation of a second measurement of said light amount.

45. An exposure apparatus to transfer a pattern illuminated with exposure light from a light source onto a substrate through an optical system, said exposure apparatus comprising:

a unit which communicates with said optical system to self-clean said optical system by irradiating said optical

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system with said exposure light in a predetermined condition before starting of exposure;

a calculation unit connected with said unit to determine a transmittance time-varying prediction function of said optical system in consideration of said predetermined condition; and

an exposure amount setting unit connected with said calculation unit to set an exposure amount control target value based on said determined transmittance time-varying prediction function.

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A107 46. An exposure apparatus to transfer a pattern illuminated with exposure light from a light source onto a substrate through an optical system, said exposure apparatus comprising:

a measurement unit to measure an amount of exposure light passing through said optical system at a predetermined interval; and

a control unit connected with said measurement unit to set said interval of a measurement performed by said measurement unit in accordance with an exposure condition.

47. A method of making an exposure apparatus to transfer a pattern of a mask onto a substrate, said method comprising:

providing an illumination optical system to irradiate said mask with exposure light;

~~providing a projection optical system to project said~~

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51. A device manufacturing method including a lithographic process, wherein exposure is performed in said lithographic process by using said exposure method according to Claim 16.

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52. A device manufacturing method including a lithographic process, wherein exposure is performed in said lithographic process by using said exposure method according to Claim 19.

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53. A device manufacturing method including a lithographic process, wherein exposure is performed in said lithographic process by using said exposure method according to Claim 22.

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54. A device manufactured by using said exposure apparatus according to Claim 24.

55. A device manufactured by using said exposure apparatus according to Claim 42.

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56. A device manufactured by using said exposure apparatus according to Claim 44.

57. A device manufactured by using said exposure apparatus according to Claim 45.

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58. A device manufactured by using said exposure

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Year	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100
1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	